

IN THE UNITED STATES PATENT AND TRADEMARK OFFICERECEIVED
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Application No. : 10/644,135
Filed : 08/20/2003
Confirmation No. : 5329
For : Electric Fluid Servo Valve and Method of
Making Same
Inventor(s) : Greg E. Ford, Harold L. Bowman
Art Unit : 3753
Examiner : John C. Fox
PDS No. : 02-ASD-334 (EM)

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5/6/08
Teresa Bonsall
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Date

APPEAL BRIEF

Sir:

Responsive to the Final Office Action dated September 6, 2007, Appellant
appeals the final rejection of claims 1-18 and 20.

I. REAL PARTY IN INTEREST

Eaton Corporation is the real party in interest. The Assignment is recorded at
Reel 014415, Frame 0605.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences of which Appellant is aware.

III. STATUS OF CLAIMS

Claims 1-18 and 20 stand rejected by the Examiner. Claim 19 has been

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cancelled without prejudice.

IV. STATUS OF AMENDMENTS

The Examiner mailed a Final Office Action rejecting claims 1-18 and 20 on September 6, 2007. Applicant amended the claims in a response filed on February 6, 2008. The Examiner entered the amendment in an Advisory Action dated February 20, 2008, but maintained the rejection of claims 1-18 and 20.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The embodiment claimed in independent claim 1 is directed to a electric fluid servo valve assembly (10) comprising a solenoid valve body (12) having a fluid inlet passage (14), a fluid outlet passage (18), a pressure sensing port (16) communicating with said outlet passage, and an obturator (20) that is moveable for controlling flow between said inlet passage and outlet passage upon connection of the inlet passage to a fluid source (not shown) (Page 4, Paragraphs [0009] and [0010]). The assembly also includes an electric actuator (22) disposed with the valve body and operable upon electrical energization for affecting movement of the obturator (Page 4, Paragraph [0010]). The assembly further includes a circuit board (38) with a pressure sensor (44) disposed on it (Page 5, Paragraphs [0013] and [0014]). The circuit board has a sensing aperture 46 that is disposed over the pressure sensing port in the valve body so that the sensing aperture in the circuit board is aligned with the pressure sensing port (Page 5, Paragraph [0014]).

Independent claim 10 recites a method of making a fluid electric servo valve assembly (10) comprising the steps of providing a valve body (12) having an inlet (14) and outlet (18) and a pressure sensing port (16) communicating with the outlet, disposing a movable obturator (20) in the valve body between the inlet and outlet for controlling flow between them (Page 4, Paragraphs [0009] and [0010]), disposing an electric actuator (22) on the valve body and effecting movement of the obturator upon energization of the actuator (Page 4, Paragraph [0010]), and disposing a circuit board

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(38) with a pressure sensor (44) thereon (Page 5, Paragraphs [0013] and [0014]). The circuit board has a pressure sensing aperture (46) that is aligned with the pressure sensor and the pressure sensing port (Page 5, Paragraph [0014]). During operation, the assembly provides an electrical indication of the sensed pressure at the valve outlet. (Page 6, Paragraph [0019]).

Independent claim 15 recites an electric fluid servo valve assembly (10) comprising a valve body (12) having a fluid inlet passage (14), a fluid outlet passage (18), a pressure sensing port (16) communicating with the outlet passage and an obturator (20) disposed therein and moveable for controlling flow between the inlet passage and outlet passage upon connection of the inlet passage to a fluid source (Page 4, Paragraphs [0009] and [0010]). The assembly also includes an electric actuator (22) disposed with the valve body and operable upon electrical energization for effecting movement of the obturator (Page 4, Paragraph [0010]). The assembly further includes a pressure sensor (44) having an inlet port (56) arranged to align with a sensing aperture (46) on a circuit board (38), where the sensing aperture is aligned with the pressure sensing port in the valve body so that the sensing aperture in the circuit board communicates with the inlet port through the pressure sensing port (Page 5, Paragraph [0014]).

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 1-20 are anticipated under 35 U.S.C. 35 U.S.C. § 102(b) by DE 198 39 843 to Hilberer ("Hilberer"), which corresponds to U.S. Patent No. 6,817,247.

VII. ARGUMENTS

Claims 1-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by DE 198 39 843 to Hilberer ("Hilberer"), which corresponds to U.S. Patent No. 6,817,247. Claim 19 was cancelled without prejudice, rendering the rejection of claim 19 moot. Appellant respectfully traverses the rejection of remaining pending claims 1-18 and 20.

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A. Claims 1-9 are patentable over Hilberer

The Examiner stated that Applicant's arguments were not persuasive because (1) the valve block 4 in Hilberer meets the recitation of the claimed valve body and (2) it is inherent that the sensor mechanism must be exposed to fluid to register its pressure. In the Advisory Action, the Examiner also noted that the pressure sensors in both Hilberer and the claimed invention are remote from the solenoid valves. Appellant respectfully disagrees.

The valve block 4 in Hilberer does not disclose or suggest the solenoid valve body recited in independent claim 1. "During patent examination, the pending claims must be given their broadest reasonable interpretation consistent with the specification. . . .The broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach." MPEP § 2111. Expanding the claimed valve block to encompass a manifold, such as valve body 4 in Hilberer, stretches the term "valve body" beyond its broadest reasonable meaning. One of ordinary skill in the art would not have considered a manifold the same thing as a solenoid valve body because the solenoid valve 12 itself has its own body and because the manifold 4 is a separate and distinct component from the solenoid valve 12. In other words, one of ordinary skill in the art would have interpreted the term "valve body" to simply mean a body of the valve, not an entire manifold in which the valve resides.

Thus, Hilberer fails to disclose the claimed valve body.

Moreover, Hilberer fails to show an assembly where the pressure sensing port of a valve body is aligned with the sensing aperture of the circuit board, which is in turn aligned with the pressure sensor. As noted in Appellant's previous responses, Figure 1 of Hilberer shows that the pressure sensors 8 are located remotely from the solenoid valves 12, making it impossible for the circuit board 17 and pressure sensors 8 to be arranged so that the pressure sensing port of the valve body is aligned with the sensing aperture of the circuit board. In the Advisory Action, the Examiner noted that it was difficult to understand the point of Appellant's argument that Hilberer has pressure sensors that are arranged remotely from the solenoid valves. Appellant notes that the

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term "aligned," as understood in the art, means "arranged in a line." As can be seen in Figure 1 of Hilberer, the remote location of the pressure sensors 8 with respect to the solenoid valves 18 and their side-by-side orientation does not show or teach arranging the sensors in a line with the valves.

Thus, nothing in Hilberer discloses or suggests a circuit board carrying portion of a pressure sensor that is aligned with a pressure sensing port in a valve body like the claimed invention.

The Examiner asserted that "it is inherent that the sensors include an aperture in that the sensor mechanism must be exposed to the fluid in order to register its pressure" (p. 3). However, this alone does not disclose the claimed invention because "[i]n relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." MPEP § 2112. The claimed alignment between the sensing aperture on the circuit board and the pressure sensing port on the pressure sensor does not necessarily flow from the limited teachings of Hilberer because, as noted in the previous response, the pressure sensors 8 in Hilberer do not even measure the pressure at the valves 12. Instead, the sensors 8 measure the fluid pressure in the pressure medium outlet bore 17, which is coupled to a regulating unit 11.

Even though it is true that a sensor must be exposed to fluid to measure pressure, the Examiner has not explained how sensing the pressure of a pressure medium outlet bore 17 in a manifold 4 (as shown in Hilberer) necessarily suggests aligning the pressure sensor with a pressure sensing port on a valve body and a sensing aperture on a circuit board so that the sensor senses an outlet pressure of a solenoid valve like the claimed invention. Hilberer's pressure sensors 8 are disposed remotely from the solenoid valves 12 and do not measure valve outlet pressure like the claimed invention. The Examiner has not explained how such an indirect route between the sensors 8 and the valves 12 in Hilberer necessarily suggests the claimed aligned structure.

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For the reasons explained above, the Examiner's final rejection of claims 1-9 is improper and should be withdrawn.

B. Claims 10-14 are patentable over Hilberer

Claims 10-14 are directed to a method for making a valve assembly having a valve body with a pressure sensing port that is aligned with a pressure sensor and a pressure sensing aperture on a circuit board. As noted above, Hilberer does not disclose the claimed valve body or a pressure sensor, pressure sensing aperture on a circuit board, and pressure sensing port on the valve body that are aligned with each other. Thus, nothing in Hilberer discloses the steps of providing such a valve body or disposing the circuit board, pressure sensor, pressure sensing aperture, and pressure sensing port in the claimed manner. The final rejection of claims 10-14 is therefore improper and should be withdrawn.

C. Claims 15-18 and 20 are patentable over Hilberer

Like claims 1-9, claims 15-18 and 20 recite a valve assembly with a valve body having a pressure sensing port that is aligned with a sensing aperture on a circuit board. As explained above, Hilberer fails to disclose the claimed valve body because one of ordinary skill in the art would not have considered the manifold 4 in Hilberer the same as the claimed valve body. Furthermore, as explained above, the solenoid valve in Hilberer is located remotely from the pressure sensor and is therefore not aligned with the pressure sensor or any sensing aperture in a circuit board. As can be seen in Figure 1 of Hilberer, the side-by-side arrangement of the valves with respect to the sensors clearly precludes any aligned arrangement between the pressure sensing port in a valve body and a sensing aperture in a circuit board like the claimed invention. The final rejection of claims 15-18 and 20 is therefore improper and should be withdrawn.

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Accordingly, it is requested that the Board reverse the Examiner's rejection and allow the claims to be issued.

Respectfully submitted,



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Dated: 05/06/2008

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VIII. CLAIMS APPENDIX

1. A electric fluid servo valve assembly comprising:
 - (a) a solenoid valve body having a fluid inlet passage, a fluid outlet passage, a pressure sensing port communicating with said outlet passage, and an obturator disposed therein that is moveable for controlling flow between said inlet passage and outlet passage upon connection of said inlet passage to a source of fluid;
 - (b) an electric actuator disposed with said valve body and operable upon electrical energization for affecting movement of said obturator; and
 - (c) a circuit board with a pressure sensor disposed thereon, said circuit board having a sensing aperture and being disposed over said pressure sensing port in said valve body such that said sensing aperture in said circuit board is aligned with said pressure sensing port.
2. The valve assembly defined in claim 1, wherein said valve body has a planar surface with said pressure sensing port located thereon.
3. The valve assembly defined in claim 1, wherein said pressure sensor is a transducer and said circuit board includes circuitry for processing a signal output of said transducer.
4. The valve assembly defined in claim 1, wherein said pressure sensor includes a piezoelectric transducer.
5. The valve assembly defined in claim 1, wherein said electric actuator includes a solenoid.
6. The valve assembly defined in claim 1, wherein said sensing aperture in said pressure sensor is sealed over said pressure sensing port in said valve body with an annular seal ring.

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7. The valve assembly defined in claim 1, wherein said sensing aperture in said pressure sensor includes an aperture formed through said circuit board.
8. The valve assembly defined in claim 1, wherein said electric actuator includes a plurality of discrete electrical terminals.
9. The valve assembly defined in claim 1, further comprising a manifold with a plurality of said valve bodies secured thereon with said inlet and outlet passages of each valve body communicating with corresponding inlet and outlet ports on said manifold.
10. A method of making a fluid electric servo valve assembly comprising:
 - (a) providing a valve body having an inlet and outlet and a pressure sensing port communicating with the outlet;
 - (b) disposing a movable obturator in said valve body between said inlet and outlet for controlling flow therebetween;
 - (c) disposing an electric actuator on said body and effecting movement of the obturator upon energization of the actuator;
 - (d) disposing a circuit board with a pressure sensor thereon, the circuit board having a pressure sensing aperture that is aligned with the pressure sensor and said pressure sensing port and providing an electrical indication of the sensed pressure at the valve outlet.
11. The method defined in claim 10, further comprising disposing the valve body on a manifold block and connecting said inlet and outlet passages to corresponding inlet and outlet ports in said manifold.
12. The method of defined in claim 10, wherein said step of disposing a circuit board includes disposing the circuit board with a pressure sensor.
13. The method defined in claim 10, wherein said step of disposing an electric

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- actuator includes disposing a solenoid to move obturator magnetically.
14. The method defined in claim 10, wherein said step of disposing a circuit board over said pressure sensing port in said valve body includes sealing said board over said port with an annular seal.
 15. A electric fluid servo valve assembly comprising:
 - (a) a valve body having a fluid inlet passage, a fluid outlet passage, a pressure sensing port communicating with said outlet passage and an obturator disposed therein and moveable for controlling flow between said inlet passage and outlet passage upon connection of said inlet passage to a source of fluid;
 - (b) an electric actuator disposed with said valve body and operable upon electrical energization for affecting movement of said obturator; and
 - (c) a pressure sensor having an inlet port arranged to align with a sensing aperture on a circuit board, the sensing aperture being aligned with said pressure sensing port in said valve body such that said sensing aperture in said circuit board communicates with the inlet port through said pressure sensing port.
 16. The valve assembly defined in claim 15, wherein said valve body has a planar surface with said pressure sensing port located thereon.
 17. The valve assembly defined in claim 15, wherein said pressure sensor is a transducer.
 18. The valve assembly defined in claim 15, wherein said electric actuator includes a solenoid.
 19. (Cancelled)

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20. The valve assembly defined in claim 15, further comprising a manifold with a plurality of said valve bodies secured thereon with said inlet and outlet passages of each valve body communicating with corresponding inlet and outlet ports on said manifold.

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IX. EVIDENCE APPENDIX

None